REMARKS

This Amendment is in response to the Office Action dated June 29, 2010. Applicant respectfully requests reconsideration and allowance of all pending claims in view of the above-amendments and the following remarks.

I. CLAIM REJECTIONS – 35 USC § 103

Claims 1, 3-6 and 8 were rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over Marzetta, U.S. Patent No. 6,307,882 B1 in view of Agrawal et al., U.S. Patent No. 6,873,606 B2.

A. **Marzetta (LUCENT TECHNOLOGIES – US 6, 307, 882)**

As acknowledged in the Office Action, Marzetta does not disclose the multiplying step according to the invention of claim 1, in which each of the Nt sub-vectors is multiplied by a distinct sub-matrix, each submatrix being associated with one of the transmit antennas.

Moreover, Marzetta relies on the assumption of a channel substantially constant in time and frequency (column 3, lines 18-20 and 55-56), whereas the discussed invention, such as that recited in Applicant's claim 1, lays down no special conditions regarding the non-variation of the channel over a finite duration or given number of symbol periods (page 3, lines 10-12 of the English specification).

Marzetta is thus not relevant toward the invention recited in independent claim 1.

B. **Agrawal et al. (QUALCOMM - US 6,873,606).**

The Examiner considers that Agrawal discloses the multiplying and sending steps. The Applicant respectfully disagrees, as proved below.

Let's consider a system comprising two transmit antennas ($N_T = 2$), two sub-vectors (x_1 and x_2) and a unitary matrix M sized (N_T, N_T).

According to equation (4) from Agrawal:

$$\begin{pmatrix}\bar{x}_1\\ \bar{x}_2\end{pmatrix} = \begin{pmatrix} M_{1,1} & M_{1,2}\\ M_{2,1} & M_{2,2}\end{pmatrix}\begin{pmatrix}\lambda_{1,1} & 0\\ 0 & \lambda_{2,2}\end{pmatrix}\begin{pmatrix}x_1\\ x_2\end{pmatrix}$$

$$\begin{pmatrix}\bar{x}_1\\ \bar{x}_2\end{pmatrix} = \begin{pmatrix} M_{1,1}\lambda_{1,1}x_1 + M_{1,2}\lambda_{2,2}x_2\\ M_{2,1}\lambda_{1,1}x_1 + M_{2,2}\lambda_{2,2}x_2\end{pmatrix}.$$

The "resulting sub-vector" $\tilde{x}_1$ is then sent on the first transmit antenna, and the "resulting sub-vector" $\tilde{x}_2$ is sent on the second transmit antenna.

According to the Examiner, unitary matrix M can thus be subdivided into two submatrices: a first sub-matrix $M_1 = (M_{1,1}\ M_{1,2})$ corresponding to the first row of matrix M, being associated to the first transmit antenna, and a second sub-matrix $M_2 = (M_{2,1}\ M_{2,2})$corresponding to the second row of matrix M, being associated to the second transmit antenna.

The discussed invention recited in Applicant's claim 1 differs from Agrawal in several points.

Firstly, according to Agrawal, the sub-matrices are sized $(1, N_T)$, whatever the number of transmit antennas is. According to the discussed invention recited in claim 1, the sub-matrices are sized $(N / Nt, N)$ with N / Nt being an integer and $Nt \geq 2$.

Secondly, according to the discussed invention of claim 1, each sub-vector is multiplied by a distinct sub-matrix.

Referring again to the previous example in Agrawal, sub-vector x1 should therefore be multiplied by the sub-matrix $M_1 = (M_{1,1}\ M_{1,2})$ and sub-vector x2 should be multiplied by submatrix $M_2 = (M_{2,1}\ M_{2,2})$

But given the matrix development above, this is not the case: sub-vector x1 is multiplied by the first term of the sub-matrix M_1 and sent on the first antenna, or multiplied by the first term of the sub-matrix M_2 and sent on the second antenna. In the same way, sub-vector x2 is multiplied by the second term of the sub-matrix M_1 and sent on the first antenna, or multiplied by the second term of the sub-matrix M_2 and sent on the second antenna.

Agrawal therefore does not disclose or suggest the multiplying and sending steps recited in claim 1 of the present application.

C. **Combination of Marzetta and Agrawal**

These documents give solutions to very different problems (determining individual

channel propagation characteristics / rate adaptive transmission). Their combination is thus non obvious.

Moreover, none of these documents discloses the multiplying and sending steps according to claim 1.

Therefore, even if combined, the resulting combination would still fail to teach or suggest the invention recited in claim 1.

II. CLAIM REJECTIONS – 35 USC § 102

Claims 1 and 9-10 were rejected under 35 U.S.C. 102(b) as being allegedly anticipated by Onggosanusi et al., U.S. Publication No. 2002/0196842 A1.

A. **Onggosanusi (TEXAS INSTRUMENTS – US2002/0196842)**

The Examiner considers that Onggosanusi discloses all the features of claim 1. Once again, the Applicant disagrees.

Indeed, if you refer to figure 2 of Onggosanusi, we can consider two "sub-vectors" s1 (corresponding to the output $22o_1$) and s2 (corresponding to the output $22o_2$).

As disclosed in paragraph [0015], these sub-vectors are each multiplied by a square root of a power weighting factor, and by the matrix U. The "resulting sub-vectors", corresponding to the outputs $58o_1$ and $58o_2$, are respectively noted x1 and x2.

As disclosed in paragraph [0018], these "resulting sub-vectors" x1 and x2 are sent (after spreading), on the different transmit antennas.

As a consequence:

$$\begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} u_{11} & u_{12} \\ u_{21} & u_{22} \end{pmatrix} \begin{pmatrix} \sqrt{P1}s_1 \\ \sqrt{P2}s_2 \end{pmatrix} = \begin{pmatrix} u_{11}\sqrt{P1}s_1 + u_{12}\sqrt{P2}s_2 \\ u_{21}\sqrt{P1}s_1 + u_{22}\sqrt{P2}s_2 \end{pmatrix}$$

According to the Examiner, matrix U can be subdivided into two sub-matrices: a first sub-matrix $u_1 = (u_{1,1}\ u_{1,2})$ corresponding to the first row of matrix U, and being associated to the antenna TAT_3, and a second sub-matrix $u_2 = (u_{2,1}\ u_{2,2})$ corresponding to the second row of

matrix U, and being associated to the antenna TAT_4 (equations 12 and 13).

As already explained in reference to Agrawal, the discussed invention of claim 1 differs from Onggosanusi as, according to the invention of claim 1, each sub-vector is multiplied by a distinct sub-matrix.

Referring again to the previous example, the sub-vector s1 should then be multiplied by the sub-matrix $u_1 = (u_{1,1}\ u_{1,2})$ and the sub-vector s2 should be multiplied by the sub-matrix $u_2 = (u_{2,1}\ u_{2,2})$, which is not the case.

Moreover, if we consider different sub-matrices, formed by the first column of the matrix U and the second column of the matrix U, the sub-matrices obtained would not be each associated to a distinct transmit antenna.

Finally, according to the invention of claim 1, the sub-matrices are sized $(N / N_t, N)$, with N / N_t being an integer and $Nt \geq 2$, whereas according to Onggosanusi, the submatrices are sized $(1, N_T)$.

As a consequence, Onggosanusi does not disclose all the features of claim 1, and thus cannot be interpreted to anticipate claim 1 under §102(b).

The Director is authorized to charge any fee deficiency required by this paper or credit any overpayment to Deposit Account No. 23-1123.

Respectfully submitted,

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